

**ATTORNEY DOCKET NO. 01-P-002 (STMI01-00013)**  
**U.S. SERIAL NO. 09/871,463**  
**PATENT**

**REMARKS**

Claims 1–20 are pending in the present application. Claims 1–7 have been withdrawn from consideration, but not cancelled.

Claim 17 was amended as being duplicative and not further limiting claim 16.

Reconsideration of the claims is respectfully requested.

**Request for Reconsideration of Restriction Requirement**

Applicants respectfully request reconsideration of the Restriction Requirement mailed April 9, 2002.

The Restriction Requirement asserts that the method claims (1–7) and the structure claims (8–20) are distinct because the structure of claims 8 and 16 may be manufactured by a materially different process than that recited in claim 1. Specifically, the Restriction Requirement asserts that the product and process are distinct because “etching, instead of chemical mechanical polishing, could be used to remove portions of the protective barrier layer.”

Restriction is only proper where the claims are independent or distinct. MPEP § 806. In passing on questions of restriction, the claimed subject matter must be compared in order to determine distinctness and independence. MPEP § 806.01. In the present application, pending independent claim 8 does not require removal of any portion of the protective barrier layer. Instead, claim 8 reads on a structure prior to removal of portions of the protective barrier layer by, preferably, chemical mechanical polishing. In addition, it is not apparent that the structure

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recited in pending independent claim 16 could be formed by etching rather than chemical mechanical polishing. Claim 16 recites a portion of a protective barrier layer over a central region of the tungsten and within the opening. Isotropic etching would uniformly remove a conformal protective barrier layer, while anisotropic etching for partial removal would remove the vertically thinner portions (e.g., at the center of an opening) leaving sidewalls alongside vertical or sloped surfaces. Neither type of etching would result in the structure recited in claim 16.

In addition, a process of making and the product made are distinct inventions only if: (A) the process as claimed is not an obvious process of making the product and can be used to make other and different products; and (B) the product as claimed can be made by another and materially different process. The Restriction Requirement provides not basis for concluding that simple etching is materially different--i.e., patentably distinct--over chemical mechanical polishing.

**35 U.S.C. § 102 (Anticipation)**

Claims 8-9, 11 and 16-18 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,175,154 to *Gillespie*. Claims 8-14 and 16-18 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,103,625 to *Marcy et al.* These rejections are respectfully traversed.

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A prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. MPEP § 2131; *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). Anticipation is only shown where each and every limitation of the claimed invention is found in a single prior art reference. MPEP § 2131; *In re Donohue*, 766 F.2d 531, 534, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985).

Independent claims 8 and 16 each recite that the protective barrier layer overlies the tungsten and is disposed within the opening through the dielectric. Such a feature is not depicted or described in the cited reference.

To the extent the Office Action relies on dimensional proportions of the drawings in *Gillespie* (e.g., Figure 1f), such reliance is improper. It is well-established that measurement of patent drawings may not be relied upon to determine if dimensional claim limitations are distinguishable. *In re Wilson*, 312 F.2d 449, 454, 136 U.S.P.Q. 188, 192 (CCPA 1963) ("Patent drawings are not working drawings . . ."); *In re Reynolds*, 443 F.2d 384, 389, 170 U.S.P.Q. 94, 98 (CCPA 1971) ("[A] patent drawing does not have to be to any particular scale."); *In re Chitayat*, 408 F.2d 475, 478, 161 U.S.P.Q. 224, 226 (CCPA 1969) ("In view of the absence in [the] specification of any written description of any quantitative value . . . , arguments based on mere measurement of the drawings appear to us to be of little value"). A patent drawing does not define the precise proportions of the elements depicted and thus may not be relied on to

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show particular distances or sizes when the specification is completely silent in that respect.

*In re Heinle*, 342 F.2d 1001, 1007, 145 U.S.P.Q. 131, 136 (CCPA 1965).

In any event, the structure depicted in Figure 1F of *Gillespie* depicts tungsten 9 filling that portion the opening in dielectric 3 that is not filled by TiN 7, such that the overlying titanium nitride layer 11 is above the opening in dielectric layer 3 rather than within the opening in dielectric 3. The interpretation of "within the opening" as requiring only that the titanium nitride lie within a boundary defined by sidewalls of the opening, without necessarily extending into the opening or below the upper surface of the dielectric, has no basis and is arbitrary and capricious. Such an interpretation would be appropriate to the recitation "above the opening," but is contrary to the plain meaning of "within the opening."

Therefore, the rejections of claims 8–14 and 16–18 under 35 U.S.C. § 102 have been overcome.

**35 U.S.C. § 103 (Obviousness)**

Claims 15 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Marcyk et al* in view of U.S. Patent No. 6,346,741 to *Van Buskirk et al*. Claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Marcyk et al* in view of U.S. Patent No. 6,103,625 to *Joshi et al*. These rejections are respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142; *In re Fritch*, 972 F.2d 1260, 1262,

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23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984). Only when a *prima facie* case of obviousness is established does the burden shift to the applicant to produce evidence of nonobviousness. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of a patent. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Grabiak*, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to

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make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. MPEP § 2142.

As noted above, independent claims 8 and 16 recite features not shown or suggested by *Marcyk et al.* Such features are also not taught or suggested by *Van Buskirk et al.*

In addition claims 15 and 20 each recite that the opening within the dielectric layer is sized to form a tungsten capacitive electrode within the opening. Such a feature is not depicted or described by the cited references. Figure 1H in *Van Buskirk et al.*, relied upon in the Office Action as depicting this feature, actually depicts a top electrode 34 that is described as comprising a noble metal such as platinum (Pt) or iridium (Ir). *Van Buskirk et al.*, column 14, lines 6–20. The tungsten plug 44 within the opening through interlevel dielectric (ILD) 38 is merely a contact, not a capacitor electrode.

Claim 19 recites that the tungsten and the portion of the protective barrier layer over the tungsten form an upper surface which is substantially planar with an upper surface of the dielectric layer. Such a feature is not depicted or described in the cited references. Figure 7B of *Joshi et al.*, relied on in the Office Action as depicting this feature, actually depicts an aluminum-copper ( $\text{Al}_x\text{Cu}_y$ ) alloy 16 and an overlying tungsten (W) region 17, without depicting a titanium or titanium nitride region over a central portion of the tungsten region 17.

Therefore, the rejection of claims 15 and 19–20 under 35 U.S.C. § 103 has been overcome.

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**AMENDMENTS WITH MARKINGS TO SHOW CHANGES MADE**

Claim 17 was amended herein as follows:

- 1 17. (currently amended) The portion of an integrated circuit structure as set forth in Claim 16  
2 wherein an upper surface of the tungsten is exposed around the portion of the protective barrier  
3 layer[ comprises a material for which removal by chemical mechanical polishing is primarily  
4 mechanical].

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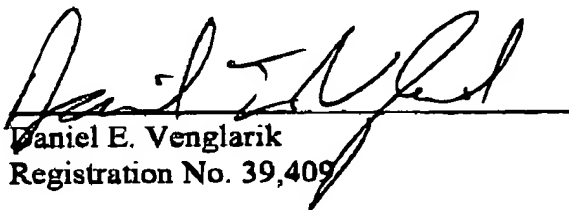
If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *dvenglarik@davismunck.com*.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

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